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Parent-Assisted Patient Controlled Analgesia for Preoperational Children with Mucositis

by

Jane Diane Criswell

Captain, USAF, NC

1994

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Master of Science

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ABSTRACT

Parent-Assisted Patient Controlled Analgesia for Preoperational Children with Mucositis

Patients undergoing bone marrow transplantation have greater than 75% chance of developing oral mucositis; an extremely painful condition which can last up to three weeks. The most effective way to assess the degree of pain a patient is experiencing is to ask him. Many tools exist to help the nurse assess a child's pain, but their usefullness depends on the child's developmental abilities. All too often there is a discrepancy between the nurse's assessment of the patient's pain and the patient's perception of the pain. This is especially problematic for children younger than 7 years of age who are typically unable to verbally describe their pain. Parents become a valuable resource for the nurse assessing a child's pain. One of the best ways in the adult population to manage pain is by using patient controlled analgesia (PCA). Due to their developmental capabilities, preoperational children are limited in the use of a PCA pump for pain management. Parent-assisted PCA is a safe, effective option for these children.

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PARENT-ASSISTED PATIENT CONTROLLED ANALGESIA FOR PREOPERATIONAL CHILDREN WITH MUCOSITIS

by
Jane Diane Criswell

Advisor: Eileen L. O'Brien, PhD, RN

Maternal/Child Nursing

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ABSTRACT

Parent-Assisted Patient Controlled Analgesia for Preoperational Children with Mucositis

Patients undergoing bone marrow transplantation have greater than 75% chance of developing oral mucositis; an extremely painful condition which can last up to three weeks. The most effective way to assess the degree of pain a patient is experiencing is to ask him. Many tools exist to help the nurse assess a child's pain, but their usefullness depends on the child's developmental abilities. All too often there is a discrepancy between the nurse's assessment of the patient's pain and the patient's perception of the pain. This is especially problematic for children younger than 7 years of age who are typically unable to verbally describe their pain. Parents become a valuable resource for the nurse assessing a child's pain. One of the best ways in the adult population to manage pain is by using patient controlled analgesia (PCA). Due to their developmental capabilities, preoperational children are limited in the use of a PCA pump for pain management. Parent-assisted PCA is a safe, effective option for these children.

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Chapter 1 INTRODUCTION

"Pain is whatever the experiencing person says it is, existing whenever he says it does" (McCaffery, 1979, P. 11). The International Association for the Study of Pain (cited in Gadish, Gonzalez, & Hayes, 1988) defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (p. 383). Both of these definitions provide for a simple measurement of pain intensity which is the patient's own report of the location and intensity of his pain.

For the pediatric patient, the measurement is not so simple. A child's ability to report his pain is directly related to his developmental level (Bibace & Walsh, 1980; Harbeck & Peterson, 1992; McGrath & Craig, 1989; & Thompson & Varni, 1986). These studies have found that children's understanding of different aspects of illness are closely related to Piaget's stages of cognitive development.

Between the ages of 2 and 6, a child is considered to be in the preoperational stage (Bibace & Walsh, 1980; Dixon & Stein, 1992; McGrath & Craig, 1989; Thompson & Varni, 1986). In this stage, a child's thinking is egocentric. He understands the world based on what he can touch, see, or manipulate (McGrath & Craig, 1989). He will believe his senses more than what he is told or what can he can remember from his experiences.

Because a preoperational child is so influenced by his environment, he is unable to distance himself from it (Bibace & Walsh, 1980). He utilizes transductive reasoning by linking one event to another simply because they happened at the same time (Bibace & Walsh, 1980; Dixon & Stein, 1992; McGrath & Craig, 1989; Thompson & Varni, 1986). The preoperational child is unable to link his pain with an illness and is more likely to define pain in simple perceptual terms such as "pain is when it hurts" (McGrath & Craig, 1989). To complicate the issue even more, a child's thinking and language abilities are likely to regress under stress (Dixon & Stein, 1992; McGrath & Craig, 1989).

Determining the intensity of a young child's pain becomes a challenge for parents and health care professionals since the child is unable to describe it (McGrath, 1990). Pain is a complex phenomenon consisting of physiological, psychological and philosophical aspects (Paice, 1991). In order to adequately treat a child's pain, we must be able to assess the intensity, location, and duration of the pain (McGrath, 1990).

Several pain assessment tools have been developed to determine the level of a child's pain. These tools can be classified as behavioral, physiological, or psychological, based on the type of pain response being measured (Broome, Lillis, & Smith, 1989; Mcgrath, 1990; Tyler, Tu, Douthit, & Chapman, 1993). Behavioral and physiological measures are

indirect methods of measuring pain and depend on the health care professional's ability to interpret the results correctly (Harrison, 1991; McGrath, 1990). Psychological measures evaluate the child's pain from his own perspective, based on his self-report of pain (Broome, et al., 1989; McGrath, 1990). Because pain is such a multidimensional phenomenon, pain assessment tools which measure only one aspect of pain have inherent weaknesses.

In the past decade there have been many advances in the treatment of pain. Advances in computer technology have led to the development of computer-controlled infusers which allow self-administration of analgesia (Bender, Weaver, & Edwards, 1990). Patient controlled analgesia (PCA) has been demonstrated to be a safe and effective method of pain management for adults and children aged 7 years or older (Acute Pain Management Guideline Panel, 1992; Berde, Lehn, Yee, Sethna, & Russo, 1991; Webb, Stergios, & Rodgers, 1989). With the exception of a study done by Gureno and Reisinger (1991), there are no reported studies of PCA use for preoperational children.

The standard of pain management for children aged 6 months to 7 years is either intermittent boluses of opioids or continuous infusion opioids with nurse administered boluses when needed (Acute Pain Management Guideline Panel, 1992; Shannon & Berde, 1989). The continuous infusion provides a steady-state of opioid while the nurse

administered bolus allows for exacerbations of pain. Unfortunately, these methods rely on the nurse's ability to accurately assess the child's pain intensity and for the child to relate the degree of pain.

Significance of the Problem

Children who are hospitalized for bone marrow transplant (BMT) are an example of a population for whom long term pain management is necessary. In preparation for BMT, the patient must undergo a conditioning regimen appropriate for his type of cancer. This conditioning regimen usually involves high dose chemotherapy and may include irradiation therapy (Ford & Eisenberg, 1990). The purpose of the conditioning regimen is to kill the rapidly dividing cells of the patient's bone marrow and any residual malignant cells. The patient's oral mucous membranes may also be damaged by the conditioning regimen because they are also composed of rapidly dividing cells (Holmes, 1991).

The damage to the oral tissue frequently results in mucositis (Holmes, 1991; Mackie, Coda, & Hill, 1991; Miser, Dothage, Wesley, & Miser, 1987; Woo, Sonis, Monopoli, & Sonis, 1993). Mucositis usually begins about the tenth day after the start of the conditioning regimen and persists for 2 to 3 weeks (Mackie, et al., 1991). The pain of mucositis is described as intense and prolonged and is not usually relieved by topical anesthetics (Ford & Eisenberg, 1990;

Mackie, et al., 1991). The pain interferes with the patient's ability to talk, eat, or swallow.

The use of PCA compared to continuous infusion with nurse administered boluses to control mucositis pain has been studied in the adolescent population (Mackie, et al., 1991). The researchers found that patients with PCA used a lower daily mean morphine dose with no differences in reported pain intensity. These results were similar to a study about addiction liability with adult BMT patients which found lower overall doses of morphine for the PCA group and no difference in reported pain levels (Chapman & Hill, 1989).

PCA is recognized as an approved method of pain management for patients older than 7 years of age (Acute Pain Management Guideline Panel, 1992). Younger children are not usually treated with PCA because preoperational reasoning abilities are considered faulty by adult standards (Dixon & Stein, 1992). Children younger than age 7 are usually treated with continuous infusion plus nurse administered boluses.

Gureno and Reisinger (1991) reported safe and successful use of PCA by children as young as three years old. These children were assisted by either nurses or parents in the operation of the PCA.

In studies which compared children's pain ratings with those of their nurses, a strong correlation between the

children's and nurses' ratings was found (Powers, 1987; Sutters & Miaskowski, 1992). However in both studies the authors expressed concern over the idea that the children continued to report moderate to severe levels of pain. It was suggested that the nurses were not providing adequate pain medication even when they knew the child was in pain.

In their study of pain in the pediatric cancer population, Miser, et al. (1987) found strong correlations between older patients' and investigator's ratings of pain. However younger patients reported more pain and had the poorest correlation with the investigator. This suggests the younger the child, the more difficult it is for the health care professional to accurately assess the child's pain.

In another study, it was found that parents are able to identify age appropriate behavioral symptoms of pain in their children (Watt-Watson, Evernden, & Lawson, 1990). The majority of children in that study were less than 5 years old. The authors concluded that parents could be a valuable resource in identifying a child's pain. Thompson & Varni (1986) reported a higher correlation between parent and child assessment of pain then between physician and child.

Purpose

The purpose of this paper is to develop a standard of care for parent assisted PCA for preoperational children

with mucositis. The need for this is based on Orem's Self-Care Deficit Theory of Nursing. Orem's theory includes the concepts of self-care agency in which a person performs actions required to maintain well-being. She also recognized the concept of dependent-care agent in which another person becomes the provider of infant care, child care, or dependent adult care (Orem, 1991).

Orem's framework for nursing is based on the concept that a person will perform necessary functions to maintain their well-being. When these functions cannot be performed, a therapeutic self-care demand exists. The nursing agency intervenes to provide self-care requirements within the framework of a wholly compensatory, partly compensatory, or supportive-educative system (Orem, 1991). By allowing the parent to assist the preoperational child with PCA, the dependent-care agent role is supported and the nursing system related to pain management can move from a wholly compensatory system to a supportive-educative system.

Chapter 2 REVIEW OF THE LITERATURE

Over the years, there have been several studies about how children of varying ages understand different concepts of illness. Many of these studies are based on the work of Piaget who said that children rely on a logic that is different from adults and which follows a developmental sequence (Bibace & Walsh, 1980; Harbeck & Peterson, 1992; Perrin & Gerrity, 1981).

The Bibace and Walsh study (1980) built on Piaget's levels of cognitive development including prelogical or preoperational, concrete logical, and formal logical stages. The investigators used trained interviewers and a questionnaire modeled after those used by Piaget to obtain information from children in three age groups. The children's responses were then categorized based on information obtained in earlier studies.

The prelogical responses were categorized as either phenomenism or contagion. Bibace and Walsh (1980) defined phenomenism as an explanation which places the cause of illness on an external concrete phenomenon that may occur with the illness but which is spatially and/or temporally unrelated. Contagion is defined as an explanation in which the cause of illness is located in people or objects which are near, but not touching, the child. The cause and the illness are frequently linked by magic. The authors found that children's explanations of illness were consistent with

their developmental stage as defined by Piaget.

The Bibace and Walsh study (1980) was a beginning attempt to explain illness from a child's perspective. Their results are very helpful when working with a healthy child who has an occasional childhood illness or injury. One weakness of the study is that only healthy school children were studied. The authors gave no information about whether any of the children had been hospitalized. This is important because cognitive development is affected by life experiences as well as age (Bibace & Walsh, 1980). Therefore a prior hospitalization could be a significant factor in a sick child's concept of illness.

Perrin and Gerrity (1981) also used Piaget's cognitive developmental stages as the bases for their study. This study was also interview based with healthy children chosen from a school system. The children's responses were placed into one of five categories including Piaget's three cognitive categories and two transitional stages (Perrin & Gerrity, 1981). They found that while children's responses to questions about illness varied widely within age groups, the overall responses of the groups followed developmental levels previously described by Piaget.

The authors of this study acknowledged the need to look more closely at children with a history of illness to determine if their concepts about illness are different from those of healthy children (Perrin & Gerrity, 1981). Both

this study and that by Bibace and Walsh (1980) point out the need to provide explanations of illness and treatments that are consistent with the child's developmental level.

In their study of 100 children, Harbeck and Peterson (1992) applied Piaget's cognitive theory to children's understanding of pain. In addition to cognitive level, this study also looked at child's age and parental pain history in relation to the child's understanding of pain.

The authors concluded that age was more closely related to the developmental sequence of understanding pain than was cognitive level (Harbeck & Peterson, 1992). They theorized that age includes life experiences which may influence a child's ability to conceptualize pain. They also found that children understood different aspects of pain at different ages.

These authors reported a high correlation between the subjects' reports of pain and the subjects' reports of parental pain experience (Harbeck & Peterson, 1992). The conclusion was that it may be important to look at the family history of pain when assessing the child's pain experience. One weakness of the study was the use of children's reports of parental pain instead of parents' reports of pain.

Reliability and Validity

In order for a tool to be clinically useful, it must be

both reliable and valid. Reliability is the ability of the tool to measure what it is supposed to measure in a consistent manner (Polit & Hungler, 1991). In other words, reliability is the same as stability or dependability. Reliability is not inherent in the tool, but depends on the population and conditions under which it is used. One way to determine reliability is the test-retest method in which the tool is used with the same population at two different times.

In general, a reliability coefficient of .70 or greater is considered sufficient (Polit & Hungler, 1991). Unfortunately many traits which are measured dynamically change over time, regardless of the stability of the tool. The changing nature of pain and individual perceptions of pain make establishing the reliability of pain assessment tools very difficult (Stevens, Hunsberger, & Browne, 1987).

Validity refers to the idea that the tool actually measures what it is supposed to measure (Polit & Hungler, 1991). Reliability and validity are related in that "a measuring device that is unreliable cannot possibly be valid" (Polit & Hungler, 1991, p. 375). The three most common types of validity are content validity, criterion validity, and construct validity.

Content validity refers to whether the tool appears to measure the area of interest (Stevens, et al., 1987). This is usually achieved by evaluation of the tool by experts in

the content area (Polit & Hungler, 1991). With pain assessment tools this is the easiest and often the only type of validity established (Stevens, et al., 1987).

Criterion validity establishes a correlation between the tool and a known true measure of the area of interest (Polit & Hungler, 1991 & Stevens, et al., 1987). In the area of pediatric pain assessment, there is no known true measure of pain and criterion validity has been established by comparison of a tool to an accepted clinical or professional standard or parental judgement (Stevens, et al., 1987).

Construct validity attempts to correlate the tool with an accepted theory (Polit & Hungler, 1991 & Stevens, et al., 1987). This is the most difficult type of validity to establish. The lack of theory development regarding pain in children makes construct validity almost impossible to establish (Stevens, et al., 1987).

Pain Assessment Tools

Physiologic indicators of pain are based on the assumption that certain physiologic measurements will change when there is pain (Acute Pain Management Guideline Panel, 1992; Tyler, et al., 1993). These indicators include heart rate, respiratory rate, blood pressure, perspiration, and endocrine changes. The problem with these indicators is that they are not specific to pain. The vital signs are

affected by virtually everything, palmer sweating is affected by other variables such as room temperature or patient activity, and endocrine changes are affected by other variables such as stress (Acute Pain Management Guideline Panel, 1992; McGrath, 1990; Tyler, et al., 1993). In addition, indicators such as palmer sweating and endocrine changes are not clinically useful due to equipment needs or processing time (Tyler, et al., 1993). While they cannot be used alone, physiologic indicators are an excellent adjunct to other methods of pain assessment (McGrath, 1990; Tyler, et al., 1993).

Behavioral Pain Assessment Scales

Behavioral tools rely on the health care professional's ability to interpret pain behaviors. There are a limited number of behavioral tools and most of them were developed for a specific patient population (Broome, 1991a). In general, behavioral scales are the best available method for assessing pain in children younger than 4-years-old.

The Procedure Behavior Rating Scale (PBRS) was developed to rate a child's distress during bone marrow aspirations (Broome, 1991a; Hester, Foster, & Beyer, 1992; McGrath, 1990). The PBRS looks at 13 behaviors and rates them as occurring or not. The tool has reported high interrater reliability of .80 or more. The scale has also been correlated with parental predictions of child's distress (Broome, 1991a) and with self-reports of pain

(Hester, et al., 1992).

The Observation of Behavior Distress Scale (OBDS), also developed for use during painful procedures, consists of eight behaviors with weighting of those behaviors (Broome, 1991a; McGrath, 1990). Interrater reliability has been reported at .80 to .91 (Hester, et al., 1992). Investigators reported moderate correlations with parental predictions of child's distress (Broome, 1991a) and with the child's rating of pain (Hester, et al., 1992).

The Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) which is based on six behaviors was developed for the postoperative period (Broome, 1991a; Hester, et al., 1992; McGrath, 1990; Tyler, et al., 1993). Interrater reliability has been reported at greater than .80 (Broome, 1991a; Hester, et al., 1992). Validity was established by comparing the CHEOPS pain score with a Visual Analog Scale (VAS) rating completed by a nurse (Tyler, et al., 1993). Since most of the testing for this scale has been done in the recovery room, its validity beyond the immediate postoperative period has been questioned (McGrath, 1990; Tyler, et al., 1993). Tyler, et al. (1993) discuss one study which compared the CHEOPS to patient self-report and found poor correlations between the two methods. Another problem is that the CHEOPS gives a sleeping child a low pain score however other investigators list sleeping as one way a child can avoid pain or distract themselves from it (Acute

Pain Management Guideline Panel, 1992; Watt-Watson, 1992).

The Child Behavior Observation Rating Scale (CBORS) was developed to study responses to immunizations and dental care (Broome, 1991a). Interrater reliability was reported to be .89 to .98. It has also been reported that the CBORS scores were related to children's self-reported fears and parental predictions of distress.

Researchers are reporting a lack of correlation between pain reports and pain behaviors (Broome, 1991a; Broome, et al., 1989; Hester, et al., 1992; McGrath, 1990; Wong & Baker, 1988). Some children demonstrate increased pain behaviors and report less pain intensity (Broome, 1991a; Broome, et al., 1989; Hester, et al., 1992). Interrater reliability varies across studies and between scales within a study (Broome, 1991a; Broome, et al., 1989; Hester, et al., 1992) and most of the scales do not separate pain from fear and anxiety (Broome, 1991a; McGrath, 1990). Finally validity of behavioral scales is difficult to establish (Broome, 1991a; Broome, et al., 1989; McGrath, 1990). Most reports of validity are based on expert opinion or on comparison to self-report scales and some scales do not report any validity information (Broome, 1991a; Broome, et al., 1989; McGrath, 1990).

Self-Report Pain Assessment Scales

Self-report is considered the best method available to measure pain intensity (Acute Pain Management Guideline

Panel, 1992; Broome, 1991b; Tyler, et al., 1993). Due to limited vocabulary, the preoperational child is not usually able to describe his pain in the same terms as an adult. However the child who is 4 years of age and older is able to use symbols to describe recent experiences (Broome, 1991b). Because of this, several self-report pain assessment tools have been developed but their use is limited with younger children.

The Visual Analog Scale (VAS) is probably the most widely tested scale (Broome, 1991b; Hester, et al., 1992; Tyler, 1993) and is used frequently with adults. The basic form of the VAS is a horizontal line on which the patient marks his level of pain. The ends of the scale may be anchored with qualifiers such as no pain and worst pain. The VAS works well for adolescents but there are limited reports of its usefulness with younger children (Broome, 1991b; Hester, et al., 1992; Tyler, 1993).

The VAS has been modified for use with younger children. Some studies suggest young children are better able to understand a vertical VAS (Lehmann, Bendebba, & DeAngelis, 1990; McConnan, 1992). This is because preoperational children are better able to understand taller is more, better than they can understand longer is more (Lehmann, et al., 1990). The pain thermometer is one example of the vertical VAS. Reports of reliability and validity are moderate to strong for older children but

remain questionable for younger children (Broome, 1991b; Hester, et al., 1992; Tyler, et al., 1993; Wong & Baker, 1988).

Faces scales are another variation of the VAS. The faces scales use a horizontal line with a series of cartoon faces along the line. The faces range from happy to sad and crying. The child is asked to point to the face that looks like his hurt (McGrath, 1990; Wong & Baker, 1988). Reliability and validity data of faces scales have been questioned (Broome, 1991b; Hester, et al., 1992).

The Oucher is another variation of the faces scale that can be used with children as young as 3 years. The Oucher consists of a poster showing photographs of a child in varying degrees of pain. The child is asked to point to the picture which looks like how he hurts (Beyer, Denyes, & Villarruel, 1992; Broome, 1991b; Hester, 1992; Tyler, 1993). Validity and reliability for this tool are based on the involvement of children in the development of the tool (Beyer, et al., 1992). The Oucher tends to have higher reliability and validity than the faces scale, but the size of the Oucher makes its use in the clinical setting more difficult (Broome, 1991b & Wong & Baker, 1988). In addition, testing has begun on culturally sensitive variations of the tool (Beyer, et al., 1992).

Projection scales use other symbols to quantify pain. The Hester Poker Chip Tool (PCT) uses four poker chips to

represent pieces of hurt (Broome, 1991b; Hester, et al., 1992). The child is asked to pick up the pieces of hurt that are the same as his hurt. The PCT has been used with children as young as 4 years old. Reliability has not been established but the PCT does correlate strongly with other accepted tools (Hester, et al., 1992).

Body Outline Markings have been used to just mark location of pain or to also rate the intensity of pain by using different colors (Van Cleve & Savedra, 1993; Hester, et al., 1992). This tool has also been tested with children as young as 4 years old. Alternate forms reliability testing indicated strong correlations between where the child points to pain sites and where he indicates pain on the drawing (Van Cleve & Savedra, 1993). Validity was demonstrated by comparison of the investigator's markings and the medical record.

Wong and Baker (1988) reported a study which compared different pain assessment scales including the simple descriptive scale, faces scale, poker chips scale, and color scale among others. They found no significant difference in validity and reliability between the scales. However preoperational children preferred the faces scale over the other scales. The authors concluded that the nurse must use the pain assessment that best fits each patient.

The Princess Margaret Hospital Pain Assessment Tool (PMHPAT) is one attempt to measure the multidimensional

aspects of pain (Robertson, 1993). The criteria of the tool include the child's facial expression, nurse's assessment by VAS, child's position in bed, sounds, and the child's self assessment with a faces scale. The authors focused on establishing high validity so that reliability could be assumed since a tool cannot be valid unless it is reliable.

Content validity was rated by bedside pediatric nurses experienced in acute pain management (Robertson, 1993). Construct validity was determined by comparing the tool to a patient's VAS and faces ratings. Because the faces scale is part of PMHPAT, using it to establish validity is questionable. The authors reported moderate to good correlations.

Problems with Pain Management

Alteration in comfort is a priority nursing diagnosis for many sick children (Ferrell, Eberts, McCaffery, & Grant, 1991). Therefore several studies have examined problems related to addressing pain management in children and determined factors which influence nurses' assessments of children's pain as well as differences between nurses' pain assessments and children's reports of pain.

Burokas (1985) surveyed nurses for demographic data and factors considered important for assessing pain. Through the use of vignettes nurses were asked to determine how much pain a patient would experience. The second part of the

study involved a chart review to determine the nurses' actual pain management practices. The author found that the type of nursing unit and the nurses' goals for pain relief were the most influential factors determining the nurses' use of medications. She also found that while nurses said they would medicate a child in the vignettes, actual practices based on chart review did not correlate.

Gadish, Gonzalez, and Hayes (1988) replicated the aforementioned study using the Burokas Nurse's Pediatric Pain Relief Questionnaire (1985). These investigators found the education level of the nurse and the age of the child were related to the nurse's selection of analgesic. They did not find a correlation between the goals of pain management and the nurses' responses to the vignettes. The authors concluded by stating their concerns about nurses' lack of knowledge about developmentally appropriate assessment tools and appropriate pain management interventions.

Powers (1987) studied differences between children's pain ratings and their nurses' pain ratings. The study included pediatric nurses and postoperative children ages six to sixteen. Nurses and children rated the child's pain using the 100 mm VAS pain tool. The nurses also completed a questionnaire. The children reported moderate to severe pain intensity that increased throughout the day. The nurses consistently and accurately rated the children's pain

at the same levels. The nurses used behavioral and verbal cues to determine pain intensity and the time since the child was last medicated as the most important factor in the decision to medicate the child.

Powers (1987) expressed concern about the nurses' knowledge of the children's pain and whether the nurses acted on that knowledge. Her concern is based on the idea that the nurses accurately assessed the children's pain but the children continued to complain of pain that was moderate to severe. The study did not include a chart review to determine the medications the children actually received.

Parents' perceptions of their child's acute pain experiences were studied by Watt-Watson, Evernden, and Lawson (1990). The parents answered questionnaires about the their perspectives of the child's pain experience and then rated their child's pain with a VAS tool. The pain ratings tended to be in the moderate range. The parents identified 11 developmentally appropriate, observable behaviors that were consistent with pain behaviors discussed in the literature. The parent also identified feelings of helplessness and guilt in relation to their child's pain. The authors concluded that parents are important in the process of assessing and treating a child's pain.

In a study of bone marrow transplant (BMT) patients, 30 adults were surveyed with the Karnofsky Performance Status (a measure of functional performance) and the Profile of

Mood State at the start of the conditioning regimen (Larson, Viele, Coleman, Dibble, & Cebulski, 1993). The Symptom Distress Scale (SDS) was given to patients and their nurses at four different times during the early post- transplant hospitalization period. Patients' SDS scores tended to stay the same over time, but nurses' SDS scores varied with time. Patients SDS showed appetite, mucositis, frequency of pain, and diarrhea as the most distressing symptoms. Nurses' SDS rated appetite, frequency of pain, mucositis, fatigue, and febrile episodes as most distressing. The authors thought the aggressive pain management philosophy at the study site was a possible explanation of why intensity of pain was not an issue for patients or nurses. The authors included a recommendation for nurses to verify their perceptions of the patient's concerns with the patient.

Most of the available pain assessment tools are one-dimensional in that they are useful only to assess the severity of pain. It is difficult at this time to quantify any other dimension of the pain experience such as the emotional impact for the child and the family. Most investigators agree that further work needs to be done to establish validity and reliability of pain rating tools (Broome, 1991b; Hester, et al., 1992; McGrath, 1990). Until then, nurses need to use the tool most appropriate for the individual child.

Patient Controlled Analgesia

The use of patient controlled analgesia (PCA) for adult pain management is not new, but the application of PCA to the pediatric population has just begun to emerge. In the past few years there have been several studies involving PCA for pain management with children (Berde, et al., 1991; Gureno & Reisinger, 1991; Mackie, et al., 1991; Webb, et al., 1989).

Webb, Stergios, and Rodgers (1989) compared morphine PCA and intravenous (IV) bolus morphine in 30 patients ages 11 to 18 who were matched for surgical procedures. The variables studied were the child's pain ratings based on the VAS or numeric scale, vital signs, the nurse's pain assessment, total amount of medication received, and patient and parent satisfaction. There were no children with cardiovascular or respiratory complications in the data set. The PCA group did experience some pruritus, nausea and IV site irritation but there was no information about these side effects for the control group. The PCA group originally used more medication then tapered themselves more quickly resulting in less overall use of morphine. The nurses' pain ratings were slightly lower than the children's pain ratings but all pain ratings were within a range which was considered acceptable. The patient satisfaction surveys indicated good satisfaction with PCA.

Berde, et al. (1991) compared morphine PCA, morphine

PCA with basal infusion (PCA-plus), and intramuscular (IM) morphine for pain management in 82 children ages 7 to 19 after major orthopedic surgery. The children were randomly assigned to one of three groups with standardized perioperative and recovery room management. Using a VAS for each item, both patients and their nurses assessed pain intensity, sedation level, nausea, and anxiety every two hours for the first 48 hours after surgery. The children also rated their satisfaction with the method of pain management. In addition, the nurses recorded sleep/awake state, vital signs, emesis, urinary retention, and oral intake.

The PCA-plus group had significantly better analgesia than the IM group based on patient and nurse reports (Berde, et al., 1991). The PCA group had significantly better results according to nurse reports but not according to the patients reports. The nurses consistently rated pain intensity lower than the patients. There was no significant difference in the amount of morphine used between groups and no significant difference in side effects experienced. The PCA-plus group had the highest satisfaction rating.

Gureno and Reisinger (1991) did a retrospective chart review of 15 PCA-plus patients ages 3 to 11. The institutional policy provided for parental/nursing assistance with the PCA for children ages 2 to 6 as needed. The faces rating scale was used for pain assessment with

most ratings at 1 from a possible score of 5 equaling the worst pain. There were no serious side- effects noted and the parental survey indicated good satisfaction with PCA.

In the Mackie, et al. (1991) study, 20 adolescent patients undergoing BMT were randomized to either morphine PCA or continuous infusion (CI) of morphine with nurse administered boluses. The patients rated their pain intensity, presence of nausea, sedation effects, and ability to concentrate using the VAS for each variable. Not only was the daily mean morphine use in the PCA group less, but the group also tapered the morphine dosage themselves as the mucositis began to clear. There were no significant differences between groups for pain ratings or side effect scores. The investigators concluded that long term use of PCA (1 to 3 weeks) by adolescents was safe and effective.

Incidence of Mucositis

Miser, et al. (1987) studied the prevalence of pain in children and young adults with cancer. The study which included both inpatients and outpatients looked at type of tumor, tumor status, pain status, analgesics received the day of data collection, and school or work attendance. First, the etiology of pain was determined by records review. This was followed by children 8 years of age and older assessing their pain intensity using a pain thermometer while the investigator's also assessed the

patients pain. For patients younger than 8-years-old, pain intensity was assessed only by the investigator using an examination of the pain site, observation of patient activity, and pain behaviors.

Fifty-six percent of the patients were experiencing pain which included patients who were in remission (Miser, et al., 1987). Approximately one half of the inpatients and one third of the outpatients were receiving narcotics. The predominant source of pain for all patients was treatment related. As with other studies, the investigators consistently underestimated patients' pain. Patients younger than 18 years of age reported more severe pain and had the poorest correlation with the investigator. This study found little evidence of addiction with one patient's narcotic use questionable in relation to the degree of pain reported.

Woo, et al. (1993) did a longitudinal study of mucositis in BMT patients ages 8- to 61-years-old. There was a daily examination of the patients' oral cavities with surveillance cultures at intervals. Of the patients studied, 76.3% developed mucositis which the authors thought could be related to the patient's absolute neutrophil count. The onset of mucositis occurred at about day 5 after BMT and lasted a median of 6 days. By day 15 after BMT, mucositis was resolved in 90% of the patients. This study excluded herpes simplex virus and graft-versus-host disease.

Chapter 3 THE MULTIDIMENSIONS OF PAIN

Pain has physiological, emotional or psychological, and philosophical components (Paice, 1991). It is the combination of the three components which accounts for the individuality of the pain experience and the difficulty of pain assessment.

The physiology of pain is very complex. Pain receptors, which are called nociceptors, are excited by mechanical, thermal, or chemical stimuli (Paice, 1991; Schoessler, Ludwig-Beymer, & Huether, 1990). When the excitation is strong enough, the nociceptors release biochemical substances which include prostaglandins. Nonsteroidal anti-inflammatory drugs (NSAIDs) act on pain by inhibiting the formation of prostaglandins.

The nociceptive message is transmitted to the dorsal horn where neuropeptides and other substances are released (Paice, 1991; Schoessler, et al., 1990). These substances bind to receptors of secondary neurons to elicit an action potential. Within the dorsal horn there is also a significant concentration of opiate receptors. These receptors are susceptible to administered opiates or to endogenous opiates which bind to the receptors and block the release of the neuropeptides (Paice, 1991).

The secondary neurons are called the spinothalamic tract neurons and are located in the anterolateral quadrant of the spinal cord (Paice, 1991; Schoessler, et al., 1990).

The majority of the spinothalamic tracts go to the thalamus with some going to the midbrain. The thalamus transmits the nociceptive message to the rest of the brain which results in the perception of pain.

The body itself has the ability to regulate nociception (Paice, 1991). This occurs when descending fibers in the spinal cord release substances such as serotonin and norepinephrine into the dorsal horn. The substances inhibit transmission of nociception in the dorsal horn. Tricyclic antidepressants are useful in chronic pain syndromes because they inhibit re-uptake of serotonin which helps to inhibit nociception.

The emotional or psychological component of pain refers to a person's perception of pain (Paice, 1991). A person's past experiences and the context of the painful event will modify his perception of pain. Pain perception can also be modified by anxiety, depression, fatigue and sleeplessness, and suffering.

It has been theorized that the limbic system in the brain processes the emotional reaction to nociception (Paice, 1991). A portion of the limbic system is also thought to control anxiety. This connection between pain and anxiety is one explanation why behavioral therapies such as relaxation, guided imagery, and distraction techniques are effective pain management tools.

Depression tends to accompany chronic pain (Paice,

1991). Pain also interferes with the ability to sleep, which leads to fatigue and sleeplessness, which leads to more pain. Finally suffering is a state which is frequently associated with pain, but which is a separate phenomenon.

The philosophy of pain refers to the investigation of the causes and realities of pain (Paice, 1991). Inadequate pain relief is due to inadequate knowledge, misconceptions, and attitudes of patients, families, and health care personnel. Many studies have found that physicians underprescribe, nurses undermedicate, families withhold medications, and patients refuse to take medications. One example of a misconception that interferes with pain management is the fear of addiction. Health care personnel, patients, and families consistently overrate the risk of addiction. The actual risk of addiction, based on research, is less than 0.01% (Eland, 1990; Paice, 1991).

It bears repeating that pain is a multidemensional, highly individual experience. This means the same nociceptive stimulus results in pain which is perceived differently by different people. The same nociceptive stimulus is also perceived differently by the same person at different times. This makes pain assessment a very difficult task, especially in the pediatric population. Pediatric pain assessment tools are one dimensional which makes it difficult to truly assess a child's complete pain experience.

Developmental Issues

Preoperational children do not view the world the same way adults do. They have the ability to use creative language and expanded cognitive skills that allow some symbolic thought (Dixon & Stein, 1992). They can pretend, recall events and ideas, and share their opinions.

Piaget called preoperational children egocentric (Dixon & Stein, 1992; McGrath & Craig, 1989; Thompson & Varni, 1986). Egocentrism refers to the child's ability to view the world from his perspective only. He simply cannot understand another person's point of view (Dixon & Stein, 1992). This is demonstrated by most preoperational children, in that social cognition develops slowly. A child at this developmental stage does not think he needs to tell the nurse about pain because he thinks the nurse can see it.

The thinking of preoperational children is characterized by animism, which means they believe inanimate objects have the ability to think and act (Dixon & Stein, 1992). The child is afraid of needles because he thinks they want to hurt him. Because the child's concept of time is just evolving, it is almost impossible to get a preoperational child to accept that a hurt now will help him feel better later. Compounding the issue is the inability to understand this incongruous event.

The reasoning ability of the preoperational child is idiosyncratic in that he will connect two unrelated events

or things, just because they happened at the same time (Dixon, 1992; McGrath & Craig; Thompson & Varni, 1986). One example of this is a child believing people live at the airport, because whenever someone comes to visit, that is where he and a parent would go to get the visitor.

Magical thinking is another aspect of the preoperational child's thinking that must be considered. Imagination and fantasy are two tools the preoperational child uses to make sense of the world (Dixon & Stein, 1992). Magical thinking is one cause of a child's fears because he is beginning to try out new relationships by fantasizing. It also prevents the child from being able to understand that his thinking is illogical in relation to frightening hospital events and procedures (Dixon & Stein, 1992; Perrin & Gerrity, 1981).

The preoperational child's sense of self is not well developed (Dixon & Stein, 1992). It is difficult for a preoperational child to separate himself from his environment (Dixon & Stein, 1992; McGrath & Craig, 1989). This means that an insertion of pain medication into an injection site in the IV line is often viewed as a shot, and the child will be quite fearful. The PCA is already connected to the system and therefore part of the child, from the child's viewpoint. The child can be taught to push the magic button to help himself feel better.

Language is a major barrier to the child's ability to

tell the nurse about his pain (Dixon & Stein, 1992; Eland, 1990). Adults use 141 different words to describe their pain (Eland, 1990) but a preoperational child is limited to only a few words like "hurt" or "owie". A preoperational child is able to understand simple stories (Dixon & Stein, 1992). Instructing a preoperational child in the use of PCA could be done in the context of a story. It is very important that the child's caregiver understands the PCA and how it works in order to reinforce teaching with the child.

Physiological and Psychological Issues in Pain Management

Misconceptions and lack of knowledge on the part of health care professionals are primary causes of undermedication of pediatric pain (Eland, 1990). However the health care professional needs to consider the physiological consequences of unrelieved pain. Respiratory rate becomes rapid and shallow which causes an inadequate expansion of the lungs leading to atelectasis. An inadequate cough can lead to retention of secretions (Eland, 1990).

Other physiologic consequences include cardiovascular changes such as increased heart rate and changes in the blood pressure which can lead to tissue ischemia (Eland, 1990). Mobility of the patient, both in bed and out, will be decreased. Fluid and electrolyte losses are increased by rapid respirations, increased perspiration, and increased

metabolic rate. There is evidence that severe pain and/or the stress associated with it, suppress the normal immune functions (Liebeskind, 1991). Psychological consequences for children include nightmares, increased anxiety, and decreased cooperation for future procedures (Eland, 1990).

The myths associated with pain management described by Eland (1988, 1990) are still believed by many health care professionals. Fear of addiction is based on the confusion of addiction with physical dependence, increased public awareness of the problems of addiction, and an incorrect belief that addiction is a significant risk. Eland (1990) used the following definitions:

> Addiction is compulsive drug-seeking that occurs when people have a continued craving for a narcotic and the need to use the drug for reasons other than pain. Physical dependence occurs when a patient who has been taking a narcotic analgesic for a period of time stops taking the drug and develops symptoms of withdrawal. (p. 875)

The development of physical dependence to morphine is similar to the dependence a patient develops when on prolonged steroid therapy. The patient is not addicted but the patient's body becomes dependent on the drug. Eland (1990) points out that there is a higher risk of developing anaphylaxis in response to penicillin G than there is of narcotic addiction when using an opioid for pain.

Another major fear of narcotic administration is the fear of respiratory depression (Eland, 1988, 1990). There is no evidence in the literature that shows children are at higher risk for respiratory depression than adults, as long as weight appropriate doses are given. Any decrease in the respiratory rate and heart rate with adequate analgesics is probably due to pain relief and is not a serious side effect (Eland, 1990).

There is a fear that opioids may make the child sleep too much (Eland, 1990). If a child sleeps after adequate analgesia, it is probably because he is comfortable enough to sleep. The health care professional must also consider the side effects of the antihistamine medication (e.g., diphenhydramine) given to control the histamine-release side effects such as pruritus and nausea.

There is a perception that children will always tell the truth about pain and if they deny pain, then it does not exist (Eland, 1988, 1990). This simply is not true if the child thinks an admission of pain will result in a shot. A child fears needles more than he fears pain (Harrison, 1991).

Another misconception is that if a child is playing, sleeping, watching television, or any other activity, than he is not in pain. Many studies have shown that a child's behavior does not match the reported intensity of his pain (Broome, 1991a; Broome, et al., 1989; Hester, et al., 1992;

McGrath, 1990; Wong & Baker, 1988). Distraction is a coping mechanism for children experiencing pain (Eland, 1988, 1990), and activities of daily living and diversional activities continue despite discomfort.

No matter what the patient's age, there continues to be a disparity between the nurse's assessment of the patient's pain and the patient's rating of the pain. Pain is a multidimensional experience in which personal meaning is applied to the pain event, which changes a person's response to pain from one event to another (Paice, 1991). There is also an emotional component to pain which means every person will experience a similar pain stimulus in very different ways.

The health care professional's personal philosophy of pain may interfere with her ability to accurately rate a patient's pain (Ferrell, et al., 1991; Harrison, 1991; Stevens et al., 1987). Studies show that while nurses are able to correlate changes in a patients pain intensity, they consistently under rate the level of pain. The discrepancies between nurses' ratings and patient ratings are even higher for younger patients (Miser, et al., 1987).

Behavioral indicators are the most frequently used method of determining a child's pain (Burokas, 1985; Gadish, et al., 1988). Investigators have been unable to separate the pain behaviors from distress behaviors and there is no correlation between pain behaviors and self-reported pain

intensity (Broome, 1991a; Broome, et al., 1989; Hester, et al., 1992; McGrath, 1990; Wong & Baker, 1988). When pain behavior was compared to the children's self-reports, it was found that children who act out more tend to report less pain.

The Benefits of Patient Controlled Analgesia

PCA is probably the most effective and individualized method of pain management available today (Wasylak, 1992). While the nurse assesses the effectiveness of the therapy, PCA removes the need for the nurse to determine the patient's self-report of pain every few hours. PCA allows the patient to decide their own pain intensity and then act on that evaluation. The infusion pump is programmed to deliver a specific dose, at a specified interval, and at a specified number of times per one and four hours (Bender, et al., 1990; Webb, et al., 1989). It may also include a continuous basal rate of medication which helps maintain a steady state serum concentration of medication when the patient is sleeping.

PCA is becoming the standard of care for postoperative adults and children older than 7 years of age (Acute Pain Management Guideline Panel, 1992). While there have been some anecdotal reports of PCA use with children younger than 7-years-old, only Gureno and Reisinger (1991) have reported a study in the literature. To bring the standard of pain management to younger children, consideration parent-

assisted PCA is congruent with the movement toward parent participation in care.

Mucositis

Children undergoing BMT have special pain management needs related to the side effects of treatment. The conditioning regimen for BMT consists of high dose chemotherapy and/or radiation to destroy all malignant cells and the child's bone marrow (Ford & Eisenberg, 1990; Holmes, 1991; Mackie, et al., 1991). These interventions, which are directed at killing fast growing cells, unfortunately damage the oral mucosa as well. The conditioning regimen also interferes with the normal replacement of oral mucosa resulting in mucositis.

Mucositis is an extremely painful condition which interferes with eating, talking, and swallowing (Mackie, et al., 1991). Mucositis usually appears about 5 days after BMT (Woo, et al., 1993) and may last for 2 to 3 weeks (Holmes, 1991; Mackie, et al., 1991). PCA has been demonstrated to be the most effective treatment for mucositis in adults and older children (Mackie, et al., 1991).

The currently accepted method of pain management for preoperational children for any reason, including mucositis, is continuous infusion and/or intermittent injection of morphine (Acute Pain Management Guideline Panel, 1992).

With this system the child must depend on the nurse to give bolus doses of medication for exacerbations of pain. Therefore the child may not receive the pain medication until he is quite uncomfortable. Further delays may occur as side effects of other medications, such as antiemetics or antihistamines, may convince the nurse that the patient is not in pain or is already overmedicated. Parent-assisted PCA would allow the parent and child to control the medication increase access to treatment, and limit inadequate pain management.

Orem's Self-Care Deficit Theory

The self-care deficit theory developed by Orem (1991) can be applied to care delivery characterized by parent-assisted PCA. Central to Orem's theory is the theory of self-care (Orem, 1991). Self-care is the ability to perform learned actions toward the self or the environment to meet identified requisites which contribute to continuance of life, self-maintenance, and personal health and well-being.

There are three types of identified care requisites (Orem, 1991). There are those requisites which are universally required by all people regardless of their age. These include such things as air, water, and food. There are the requisites which specifically regulate human developmental processes. These include the developmental stages of childhood. And there are those requisites that

are associated with a person's health state and associated health care.

Orem's theory (1991) recognizes that children are not always capable of providing self-care. The theory includes the concept of the dependent-care agent who is the provider of infant care or child care. The dependent-care agent is usually the child's parent.

The next level of Orem's theory is the theory of self-care deficit or, in a child's case, dependent-care deficit (Orem, 1991). Dependent-care deficit refers to the inability of the dependent-care agent to provide care associated with health-related requisites due to a partial or complete lack of knowledge about those requisites. This deficit allows for the need for nursing care when the ability of the dependent-care agent does not or may not in the future meet the requisite needs of the child.

Orem's theory of nursing system establishes the form of nursing and the relationship between the patient and the nurse (Orem, 1991). She identified three types of nursing systems in this theory. Wholly compensatory nursing systems are needed when the people who make up a dependent-care group are unable to provide for the child's self-care requisites. Partly compensatory systems exist when both the nurse and the dependent-care agent each provide for the child's self-care requisites.

Supportive-educative systems are for situations where

the dependent-care agent is able to provide for the child's self-care requisites, but needs some help meeting those needs (Orem, 1991). Types of nursing help include acting or doing for; guiding; teaching; supporting; and providing a developmental environment. The goal of the nursing system is to allow the dependent-care group to function as independently as possible.

In relation to pain management, parent-assisted PCA would allow the nursing system to move from a wholly compensatory system to a supportive-educative system. If the method of pain management is continuous infusion with nurse administered boluses, the dependent-care unit of the child and parent is totally dependent on the nurse for pain relief. If parent-assisted PCA is used, the dependent-care unit is able to provide pain relief with support and teaching from the nurse.

Questions of Safety

In addition to the therapeutic parameters programmed into the PCA pump, one safety mechanism is the patient himself. One of the first symptoms of narcotic overdosage is that the patient will become sedated. Sedation will prevent the patient from being able to push the PCA button to obtain more medication. One argument against parent-assisted PCA is that it removes this safety mechanism. The assumption is that if the parent is pushing the button, she

may inadvertently overdose the child. However if the parameters are set therapeutically, this will not occur.

Regardless of the route of administration, the professional nurse maintains the responsibility to continually assess the patient for dose related symptoms. The dose related symptoms of narcotics include change in level of consciousness, drowsiness, and respiratory depression (Shannon & Berde, 1989). Parent-assisted does not mean lack of nursing care.

The limits programmed into the PCA pump are based on total hourly dose per body weight. This means that even if the parent gave the child the maximum dosage possible with the PCA, the dose should be within safe limits. Nursing is required to perform frequent assessments to detect early dose related symptoms, even if the parent is assisting the child with the PCA. With adequate teaching, the parent could learn to observe the child for the dose related symptoms.

New developments in technology may help make parent-assisted PCA even safer. It is well known that medications are prescribed on the basis of body weight. However, variation exists among individuals due to metabolism, clearance rates, and prior history of medication use. Pharmacokinetically based patient controlled analgesia (PKPCA) will allow the patient to adjust his medication based on plasma concentrations of the medication (Hill,

Jacobson, Coda, & Mackie, 1991). The limits set into the PKPCA would be based on the patient's **individual** minimum effective analgesic concentration (MEAC). The MEAC for each opioid is very consistent for each person but varies widely between patients. Thus the PKPCA could provide increased safety for parent-assisted PCA.

STANDARD OF CARE

PARENT-ASSISTED PATIENT CONTROLLED ANALGESIA

1. PURPOSE: To establish a policy to provide safe and effective pain management using Patient Controlled Analgesia (PCA) for children ages 2 to 6.

2. REFERENCES: Acute Pain Management Guideline Panel. (1992). Acute Pain Management: Operative or Medical Procedures and Trauma. Clinical Practice Guideline (AHCPR Publication No. 92-0032). Rockville, MD: Agency for Health Care Policy and Research, pp. 20, 21, 51, 71-76.

American Pain Society Subcommittee on Quality Assurance Standards. (1990). Standards for monitoring quality of analgesic treatment of acute pain and cancer pain. Oncology Nursing Forum, 17, pp. 952-955.

Gureno, M. A. & Reisinger, C. L. (1991). Patient controlled analgesia for the young pediatric patient. Pediatric Nursing, 17, pp. 251-254.

Howe, C. J. (1993). A new standard of care for pediatric pain management. MCN, 18, pp. 325-329.

Hospital PCA policy
Hospital cardiac arrest/code response policy
Hospital intravenous management policy
Pain Management Flow Sheet

3. SCOPE: All personnel caring for children ages 2 to 6 with PCA therapy for pain management.

4. DEFINITIONS:

a. Pain Behaviors: Decreased body movement, anxious, restless, facial expressions of pain, unconsolable crying, moaning, whimpering, body position (guarding pain site).

b. Approved, age appropriate pain scales:
Verbal Children: Wong/Baker Faces Pain Rating Scale; Oucher Scale; Poker Chips Scale; Pain Thermometer.
Nonverbal Children: CHEOPS; parental input

5. OUTCOMES:

a. Patient will state that pain is equal to or less than a score of 3 on a 0 to 10 scale.

b. Patients who are unable to communicate verbally will demonstrate behaviors indicating absence of pain and vital signs will be appropriate for age.

c. Patient will maintain respiratory function and level of consciousness while receiving PCA narcotics.

d. Potential side effects from PCA narcotic analgesics (pruritus, nausea/vomiting, constipation, urinary retention) will be managed for maximum patient comfort.

e. The patient/parent will participate in care and ADLs as much as possible.

f. Patient/parent will verbalize understanding of pain condition and PCA therapy.

g. Parent will be able to verbalize and demonstrate appropriate use of PCA pump.

6. EQUIPPING PATIENT ROOM:

a. The following equipment should be placed at the child's bedside:

(1) Oxygen setup with appropriate sized mask.
(2) Bag/Valve mask
(3) Complete suction setup.
(4) Appropriate size oral airway.
(5) Pulse oximeter for first 24 hours
(6) Narcan available in medication room/cart

b. A physician's order will generally state the equipment to be placed at the patient's bedside. If the physician requests "PCA precautions" this will include all the above listed equipment/supplies.

7. PAIN ASSESSMENT:

a. Assess patient's pain at least every four hours with vital signs and more frequently if the pain is greater than 8 on a scale of 8 to 10 or poorly controlled.

b. Use approved, age-appropriate pain scale to help the patient communicate the intensity of pain. Encourage parental participation to assess pain intensity.

c. Evaluate degree of pain relief 30 minutes to 1 hour after any change in PCA pump parameters.

d. Document pain assessments on Pain Management Flow Sheet. Include pain score, respiratory rate, sedation level, PCA information about pump settings, number of patient attempts to obtain medicine, and actual amount of medication received.

e. Use PQRST mnemonic for more in-depth assessment of pain:

P = palliative/provocative: what makes the pain better or worse
Q = quality
R = region, location
S = severity
T = timing: constant, intermittent

8. PCA THERAPY:

a. Validate correct drug, concentration, PCA settings, and precautions including Narcan based on physician's order at the start of therapy and the beginning of every shift.

b. Initiate PCA therapy according to hospital PCA policy.

c. Initiate patient/parent teaching about PCA therapy and operation of the pump:

(1) Timing and method of pain assessment
(2) Purpose of PCA therapy
(3) Explanation of PCA precautions equipment
(4) Features and safety mechanisms of the pump
(5) Reassure patient/parent that addiction to medication is unlikely
(6) Possible side effects of medication
(7) Emphasize to parent that he/she may push PCA button if child is indicating there is pain

d. Management of respiratory depression (too much sedation). If patient is unresponsive and respirations are less than 8 per minute (greater than 2 years) or less than 12 per minute (less than 2 years):

(1) Stop the PCA infusion of narcotic analgesic.
(2) Initiate appropriate resuscitative measures.
(3) Administer oxygen via face mask at 5 L/min.
(4) Administer Naloxone (Narcan) IV or IM per physician's order.
(5) Notify physician immediately. If airway obstruction or apnea occurs, follow cardiac arrest/code response policy.
(6) The patient should not be left unattended. Assess and record vital signs every 5 minutes until level of consciousness and respiratory rate return to baseline.
(7) Document episode on Pain Management Flow Sheet and in nursing narrative notes as Medical Problem Note.

e. Utilize appropriate adjunct pain medications as ordered:

(1) NSAIDs
(2) Muscle relaxants for muscle spasms

9. MANAGEMENT OF SIDE EFFECTS:

a. Pruritus:
(1) Administer prn medication as ordered.
(2) Discuss alternative narcotic with physician for severe, unmanageable pruritus.

b. Nausea/Vomiting:
(1) Administer prn medication as ordered.
(2) Notify physician of nausea and vomiting uncontrolled by prn medication order.

c. Constipation:
(1) Assess for bowel sounds and flatus
(2) Encourage ambulation and activity appropriate to health condition and age
(3) Administer stool softener or bowel motility agent as ordered

d. Urinary retention:
(1) Notify primary physician
(2) Apply warm compresses over bladder
(3) Encourage patient to ambulate if possible
(4) Straight-cath as ordered by physician

10. REPORTABLE CONDITIONS:

a. Notify physician **Immediately** if any of the following occur:
(1) If respiratory rate is less than 8 per minute (greater than 2 years) or less than 12 per minute (less than 2 years).
(2) If child is unresponsive.
(3) If there is evidence of airway obstruction
(4) If O_2 saturation is lower than that specified in orders.
(5) Patient is having hallucinations or delirium

b. Pain Intensity- notify physician if the patient's pain score is greater than 5 on a 0 to 10 pain scale

c. Notify physician if pain is not controlled 1 hour after initiating PCA. (Pain score greater than 5 on 0 to 10 scale or patient is observed to be in pain).

Chapter 4 Comprehensive Examination

Critique the body of literature relevant to the topic under study. Based on your critique and a theoretical/ methodological framework, make recommendations for your area of nursing practice.

Patient Controlled Analgesia has been identified as an aggressive method of both short- and long-term pain management (Acute Pain Management Guideline Panel, 1992). This aggressive pain management has been linked to decreases in postoperative morbidity and mortality in high risk populations such as the very young and the very old.

Bone Marrow Transplantation is becoming a more common treatment for patients suffering from leukemias, lymphomas, aplastic anemia, inborn errors of metabolism, and various solid tumors (Ford & Eisenberg, 1990). Woo, et al. (1993) reported a 76.3% incidence of mucositis which can be a painful, life-threatening side-effect of BMT. The topical anesthetics frequently used for pain management are often ineffective. PCA has been identified as the best method of pain management for this patient population (Ford & Eisenberg, 1990).

In the past several years, there has been an increase in the study of methods to assess pain in the pediatric population (Broome, et al., 1989; Hester, et al., 1992). While these tools have helped to improve pain assessment, discrepancies remain between nurses' assessments of pain and children's self assessment of pain (Burokas, 1985; Gadish, et al., 1988; Powers, 1987; Watt-Watson, et al., 1990).

Parents have been identified as a valuable resource in the assessment and management of children's pain (Powers, 1987).

The literature is replete with studies related to pain management and PCA use among adult cancer patients; however, there are far fewer studies about PCA for management of pain in children with cancer (Sutters & Miaskowski, 1992). The studies which have been reported suggest that inadequate prescription of analgesics by physicians remains a significant problem in the management of pediatric cancer pain (Eland, 1990; Sutters & Miaskowski, 1992). Other studies suggest that current schedules using administration of morphine every 2 to 4 hours may be inadequate to control severe pain in children with cancer (Sutters & Miaskowski, 1992).

The Clinical Nurse Specialist

Hamric (1989) identified four roles of the clinical nurse specialist (CNS) which include expert practitioner, educator, consultant, and researcher. These roles require the CNS to be proficient in five skills: Change agent, collaborator, clinical leader, role model, and patient advocate. Accomplishing a change in pain management practices would require the use of all the skills and roles of the CNS.

As expert practitioner, the CNS would need to demonstrate her ability to accurately assess the pain

intensity of the preoperational child. As an educator, the CNS would provide information to the child/family unit, the nurses caring for the children, and the physicians responsible for writing the medication orders.

The CNS would function in the consultant role to disseminate the information throughout the health care organization. She could also be responsible for bringing the new treatment modality to other institutions. At a minimum, the CNS as researcher would bring information that has been presented in the literature to the nursing staff. She would also be an integral part of the research team studying the use of parent-assisted PCA.

The CNS would need to use the change agent role in conjunction with the other CNS skills to make the proposed change. This change would require collaboration with physicians and families; clinical leadership to guide the nurses to accept the change; role modeling to demonstrate the clinical skills required by the change; and by proposing the change and working for acceptance, she would be advocating for the patient. The combination of these roles and skills are required by the CNS to encourage developments in nursing practice consistent with accepted nursing theory and current standards of practice.

The American Nurses' Association (ANA) standards for maternal and child health nursing encompass the family unit within the scope of caring for a child (1983). Orem's self-

care deficit theory also includes the family as a unit for child health care by recognizing the dependent-care agent (1991). The American Pain Society Subcommittee on Quality Assurance Standards has published a set of standards for acute pain and cancer pain (1990). The first standard is "Acute Pain and Chronic Cancer Pain Are Recognized and Effectively Treated (p. 953). Promoting parent-assisted PCA for young children is consistent with these standards and theory.

Health care professionals tend to be very resistant to change. In order to promote this method of pain management, the CNS must first convince the physician that the method is a safe and effective therapy. Physicians are educated to look at new developments from a scientific perspective. In other words, physicians prefer to evaluate new ideas based on acceptable research findings. There are no controlled studies comparing the use of PCA to nurse administered medication for preoperational children reported in the literature. The Gureno and Reisinger (1991) study was a retrospective chart review with a small study group.

Ethical Issues Related to Research

Since World War II, when Nazi atrocities were revealed at the Nuremberg trials, the ethics of medical research have been scrutinized (Lee, 1991). The 1964 Declaration of Helsinki recognized the especially vulnerable populations

which include infants and young children. Ethical concerns have produced the Institutional Review Board (IRB) which approves medical research within an institution (Lee, 1991; Thurber, Deatrick, & Grey, 1992).

The ANA Code for Nurses holds nurses ethically accountable to protect the patient (Lee, 1991). This is especially important for the young pediatric patient who is typically unable to protect himself. The CNS, in the role of researcher and patient advocate, becomes a key figure in the research process.

There are three ethical principles which must be adhered to when designing a research study involving human subjects: (1) respect for persons, (2) beneficence, and (3) justice (Lee, 1991; Thurber, et al., 1992). The principle of respect for persons involves obtaining informed consent from the subject. For children the consent is provided by the parent; however, children 7-years-old and older must also provide assent. Preoperational children are considered unable to provide assent due to developmental capabilities. This does not preclude the need to provide age-appropriate explanations about the treatment to the child.

The principle of beneficence or nonmaleficence requires that the study will do no harm to the subject (Lee, 1991; Thurber, et al., 1992). This requires an analysis of the risk-benefit ratio. Lee (1991) stated that parental consent for children should be limited to research which imposes

reasonable or minimal risk to the subject. Minimal risk is defined as no risk of harm greater than that which could be found in everyday living or during routine medical testing (Thurber, et al., 1992). Reasonable risk involves a "minor increase" over what is considered minimal risk and the research is likely to have a benefit for the subject or be generalizable knowledge that will benefit others.

The principle of justice involves the fairness in distribution of the burdens and benefits of research (Lee, 1991). This is to ensure vulnerable populations are not bearing an unfair burden of the research. The clinical researcher must use fair selection procedures when recruiting a study population.

Pain Management Practices

Current pain management practices discussed in the literature for young pediatric patients involves nurse administered medications. The medications may either be a continuous IV infusion of the medication or nurse administered intermittent injections (Acute Pain Management Guideline Panel, 1992). This method places complete control of pain management in the hands of the nurse. As discussed earlier, the nurse's ability to assess pain in young children has been questioned. The Watt-Watson, et al. study (1990) concluded that the parent is better at assessing her child's pain than the health care professional.

By using parent-assisted PCA for pain management, control of the treatment is returned to the family unit. Since this method does not remove the nurse's responsibility for monitoring the patient, there should be no increased risk to the patient.

Proposed Research

For the results to be more accepted, the research design should be experimental. After parental consent is obtained, the children would be randomly assigned to either the parent-assisted PCA group or the continuous IV with nurse administered bolus group. If either method of pain management is unsatisfactory, the child would be dropped from the study and other techniques would be used for pain management.

Sample Population

The sample would be a convenience sample of children admitted for BMT. There are several reasons for choosing this patient population. The first reason is that these children have a high probability of developing mucositis, a condition which is known to cause severe pain and which cannot be treated by regional pain management techniques. This is a condition which lasts for up to 3 weeks (Holmes, 1991; Miser, et al., 1987; Woo, et al., 1993) resulting in an extended data collection opportunity. Furthermore, the results will directly benefit the child and family participating in the study.

Another reason for this population is that it is very unusual for a parent not to be at the child's bedside. BMT is a potentially life-threatening treatment which requires a long recovery and follow-up period (Ford & Eisenberg, 1990). In order for a child to be selected for BMT, the family must demonstrate a high level of involvement with and support of the child's care.

Children undergoing BMT are admitted to special care units where the nurses are familiar with the complex treatment the children will require. The homogeneity of the nurses on the BMT unit will hopefully decrease the variables of pain assessment skill and factors that influence the nurses decisions to medicate the patient. The effect of these variables could be further minimized by surveying the nursing staff about attitudes toward pain management and factors which influence their actual practice of giving pain medications. This could be accomplished with the Burokas Nurse's Pediatric Pain Relief Questionnaire (1985).

Finally, restricting the study population to a single diagnostic group will help decrease the extraneous variables associated with different treatments creating different pain stimuli. Although BMT patients have several sources for pain, the most severe source seems to be caused by mucositis (Ford & Eisenberg, 1990).

Educational Needs

The study will require development of parent/patient teaching standards related to the PCA pump and the medications used. The parents and children will need to learn how to operate the PCA pump. The parents will need to be taught the purpose of PCA treatment, how to determine if their child's behavior is related to pain, what the side effects of the medication are, and how to look for an increased sedation level. The parents of children assigned to the nurse administered medication group would receive the same education except that which is related to the PCA pump.

The nursing staff will need to be educated to use the selected pain assessment tools. To decrease variability, pain assessment tools need to be selected before the study begins. More than one tool needs to be available, because a child's ability to use any given scale will vary with the child's developmental abilities and previous experiences (Hester, et al., 1992; Wong & Baker, 1988).

Data Collection

When subjective assessment of the results occurs, it is considered a better study if the investigator and the subjects are blinded to the treatment protocol for each subject (Polit & Hungler, 1991). This will not be possible for this study for several reasons. The patient/family unit will receive slightly different instructions depending on the treatment modality as discussed earlier. The nursing

staff will obviously be aware of which treatment group the child is in. Finally the investigator cannot be blinded to the treatment groups because the equipment used for each treatment is very different. This problem could be minimized by using more than one investigator and comparing their results.

The proposed study should be acceptable to the IRB because it compares current practices to a therapy which has been proven to be effective for older patients. The change in pain management practices will minimally increase any risk to the child. Furthermore, the child would receive a direct benefit from the study in the form of improved pain management.

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